

## Technological Studies

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We live in a technological age and the impacts of technology on the individual, society, and environment are great. Technology is the study of the human quest for solutions to problems involving the design and production of artifacts, systems, and environments. Society needs professionals who understand technological forces and are prepared to help people manage those forces. Students in either the Technology/Pre-Engineering Education program or iSTEM (Integrated STEM Education), each being integrative STEM-based programs, study a variety of themes including historical and contemporary influence of designed objects on end users and society, design style, product development, human factors engineering, product modeling, problem-solving techniques, environmental and biotechnical systems, communication, electronics and computers, mechanisms and robotics. Emphasis is placed on understanding and applying core STEM principles to develop design and problem-solving skills. Courses are conducted in modern classroom/laboratories housed in the School of Engineering.

“Technology/Pre-Engineering Education” is a broad term used in the United States to describe a curriculum that addresses the need to educate students about the many ways that technology affects their lives. At The College of New Jersey’s School of Engineering, this area of certification has been redesigned to include K-12 technological and pre-engineering principles. The goal of the program is to prepare teachers who can explain to students how objects that they interact with on a daily basis have been conceived of, designed, and fabricated by another person or group of people—an engineer, architect, graphic/fashion or industrial designer. These objects run the gamut from the design of the package that contains their cereal to the fabrication and fashion design of their clothing, to the water supply system that allows them to wash in the morning, to the myriad of engineering advances that allow them to play music, view a video, or instant message friends from their mobile phones while sitting comfortably in their climate-controlled houses.

“Standards for Technological Literacy: Content for the Study of Technology” were published in 2000. The National Science Foundation (NSF), the American Association for the Advancement of Science (AAAS), and most recently the National Academy of Engineering (NAE) have recognized technology/pre-engineering education as a new field of study and as an important element of school reform. Continuing its commitment to providing New Jersey’s children with an education that enables them to succeed in the new economy, the New Jersey Department of Education established a new Core Content Standard #8 for “Technological Literacy.” Students in the Department of Technological Studies with a teacher-education specialty in either Technology/Pre-Engineering Education or iSTEM receive provisional certification to teach in New Jersey schools. Most states recognize teacher candidates from these NCATE nationally accredited program. Students graduating from the program also take positions in business and industry such as manufacturing design and prototyping, industrial sales, training and development, or become entrepreneurs. Some students choose to pursue this program to prepare for positions in higher education, commerce, media, or government service. Graduates from both the Technology/Pre-Engineering Education and iSTEM programs can become pre-certified to teach PLTW courses and are in high demand.

## Entrance, Retention, and Graduation Standards

Every major program at the College has set standards for allowing students to remain in that program, to transfer within the College from one program to another, and to graduate from a program. The following are the standards for programs in technological studies. Minimum grades are noted in parentheses:

- Retention in the technology/pre-engineering education major is based on the following performance standards in these “critical content courses”: ETE 261/Multimedia Design (C+); and TED 280/Introduction to Teaching Technology Education (C+).
- Transfer to the technology education major from another program within the College is based upon the following performance standards in these “foundation courses”: ETE 261/Multimedia Design (C+); and TED 280/Introduction to Teaching Technology Education (C+).
- Retention in the iSTEM major is based on the following performance standards in these “critical content courses”: ETE 261/Multimedia Design (C+); and
  - ELST—ELE 201/RAL221 (C+)
  - ECST—ECE 102/202 (C+)
  - ELEU—ELE 201/RAL221 (C+)
  - SEST—WRI 102/SPE 103/FSP (B)
  - DHST—WRI 102/SPE 103/FSP (B)
- Transfer to the iSTEM major from another program within the College is based upon the following performance standards in these “foundation courses”: ETE 261/Multimedia Design (C+); *and*
  - ELST—ELE 201/RAL221 (C+)
  - ECST—ECE 102/202 (C+)
  - ELEU—ELE 201/RAL221 (C+)
  - SEST—WRI 102/SPE 103/FSP (B)
  - DHST—WRI 102/SPE 103/FSP (B)

## Technology/Pre-Engineering Education (TCED\_BS\_02) or iSTEM (ELST/ECST/DHST/SEST\_BS\_02)

Candidates for a teacher-education certificate must have a 2.75 cumulative grade point average to successfully complete their teacher education program. They also must meet the state hygiene/physiology requirement; the state Harassment, Intimidation, and Bullying Prevention (HIB) training certificate requirement, and pass the appropriate PRAXIS examination before the New Jersey State Department of Education will issue the appropriate certificate. iSTEM graduates will be able to qualify for a middle school endorsement in math and science and technology education with the technology specialization. Teacher-education candidates will receive a “certificate of eligibility with advanced standing” which requires a candidate to be provisionally certified for his or her first year of teaching. After one year of successful teaching, the candidate is eligible for a permanent certificate. Students should consult with their departmental advisers in planning their academic program. These plans should take into account requirements for the major, general education, professional courses, and state certification.

## Suggested Course Sequence

### Technology/Pre-Engineering Education—First Year (by advisement)

FSP	First Seminar	1 course unit
MAT	127/Calculus A	1 course unit
TST	161/Creative Design	1 course unit
ETE	261/Multimedia Design	1 course unit
PHY	201/General Physics I	1 course unit
ETE	111/Engineering Design	1 course unit

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ETE	131/Engineering Math	1 course unit
WRI	102/Academic Writing (if not exempt)*	1 course unit
<b>Total for year</b>		<b>8 course units</b>

*\*It is recommended that students exempted from this course take other liberal learning courses.*

### **iSTEM with the Technology Specialization**

**Elementary Education iSTEM (ELST) or  
Elementary Education-Urban Education Specialization (ELEU)  
Early Childhood Education iSTEM (ECST) or  
Deaf and Hard of Hearing iSTEM (DHST) or  
Special Education iSTEM (SEST)**

Students must complete the iSTEM Core and a Specialization:

TST	161/Creative Design
MAT	127/Calculus A
ETE	131/Engineering Math (counts toward NJDOE Middle School Math Endorsement)
PHY	201/General Physics I <i>or</i> SCI 103/Physical, Earth, and Space Sciences
Two additional approved science courses	
ETE	261/Multimedia Design
ETE	271/Structures and Mechanics
MAT	105/Mathematical Structures and Algorithms for Educators I
TED	460/Integrated STEM for the Child/Adolescent Learner
One iSTEM approved electives to meet certification requirements.	

The Technology Specialization also requires four additional units with one from 300 level or higher from among the following (*for technology education certification candidates must have at least three at the 300 level or higher*):

ETE	111/Engineering Design
ETE	275/Mechanics and Materials
ETE	281/Analog Circuits and Devices
ETE	341/Environmental and Biotechnology Systems
ETE	361/Architectural and Civil Engineering Design
ETE	371/Mechanical Systems Design
ETE	381/Digital Electronics
ETE	461/Manufacturing Systems,
ETE	492/Facilities Design and Management.

Through the iSTEM with a Technology Specialization, students can qualify for endorsements in middle school mathematics and science by completing 15 credits (=3.75 course units) in each discipline and successfully pass the appropriate middle school PRAXIS and can qualify for an endorsement in Technology Education by completing 30 credits (=7.5 course units) in required courses including 12 credits (=3 course units) at the 300 level or above and successfully passing the technology education PRAXIS exam.

### **Suggested Course Sequence**

#### **iSTEM Technology Specialization—Freshman Year (by advisement)**

FSP	First Seminar	1 course unit
MAT	127/Calculus A	1 course unit
TST	161/Creative Design	1 course unit
ETE	261/Multimedia Design	1 course unit
Science Option #1 (by advisement)		1 course unit

#### **Technological Studies-4**

MAT	105/Mathematical Structures and Algorithms for Education I	1 course unit
ETE	131/Engineering Math (counts toward NJDOE Middle School Math Endorsement)	1 course unit
WRI	102/Academic Writing (if not exempt)*	1 course unit

*\*It is recommended that students exempted from this course take another liberal learning course.*

**Total for year 8 course units**

#### **Technology Minor**

The minor consists of five units:

TST 161/Creative Design

Select four of the following courses (at least one 300-level course):

- ETE 111/Engineering Design
- ETE 131/Engineering Math (counts toward NJDOE Middle School Math Endorsement)
- ETE 261/Multimedia Design
- ETE 271/Structures and Mechanics
- ETE 275/Mechanics & Materials
- ETE 281/Analog Circuits and Devices
- ETE 341/Environmental and Biotechnology Systems
- ETE 361/Architectural and Civil Engineering Design
- ETE 381/Digital Electronics
- ETE 461/Manufacturing Systems